RECEIVED
CENTRAL FAX CENTER
SEP 02 2008

IN THE CLAIMS

1. (Currently Amended) A method of detecting fluid movement, accumulation, or depletion determining the presence of fluid volume in mammalian tissue of a mammal having a body, comprising:

providing a first set of injection electrodes and a second set of measurement electrodes;

positioning members of the first set of electrodes on an external surface of the body to introduce electrical current flow through the mammalian tissue and thereby establish flow paths that define injection vectors along which electrical currents flow between two or more injection electrodes;

positioning members of the second set of electrodes on the body to define measurement vectors relating to electrical voltages produced in response to the electrical currents flowing between the injection electrodes, the injection and measurement vectors defining an anatomical space of the mammalian tissue;

deriving from each of different pairs of the injection and measurement vectors two or more electrical bio-impedance values that is characteristic of indicating the electrical bio-impedance of body tissues and fluids within a region of the anatomical space;

and analyzing the two or more electrical bio-impedance values to detect a presence of a volume of fluid or change in a volume of fluid for indications of fluid movement, accumulation, or depletion affecting the region in the anatomical space.

2. (Previously Presented) The method of claim 1, in which the electrical current flow is introduced at multiple signal frequencies and the analyzing of the electrical bio-impedance values includes Fourier analysis and data reduction.

3. (Previously Presented) The method of claim 1, in which the electrical current flow is introduced by a complex electrical current waveform and the analyzing of the electrical bio-impedance values includes chirp transform analysis or waveform analysis.

4. (Original) The method of claim 1, in which the analyzing of the electrical bio-impedance values entails determining differences in the electrical bio-impedance values derived from the injection and measurement vectors.

5. (Original) The method of claim 4, further comprising determining temporal changes in the electrical bio-impedance values derived from the injection and measurement vectors.

6. (Original) The method of claim 1, in which the analyzing of the electrical bio-impedance values entails determining temporal changes in the electrical bio- impedance values derived from the injection and measurement vectors.

7. (Original) The method of claim 1, in which each member of the first set includes a current source and a current sink, the current source and current sink being positioned at locations on the body such that electrical current flowing from a current source of one of the members flows into a current sink of another one of the members.

8. (Original) The method of claim 1, in which each member of the first set includes multiple current sources and multiple current sinks, the current sources and current sinks being positioned at locations on the body such that electrical current flowing from a current source of one or electrical currents flowing from current sources of more than one of the members flow into one or more current sinks of another one of the members.

9. (Original) The method of claim 1, in which the injection and measurement vectors define a nominal shape of the anatomical space in the presence of a nominal quantity of fluid, and in which the presence of other than the nominal quantity of fluid changes the anatomical space from its nominal shape.

10. (Original) The method of claim 1, further comprising analyzing the electrical bio-impedance values to determine the extent of fluid volume in the mammalian tissue.

11. (Original) The method of claim 1, in which the fluid includes blood, and further comprising analyzing the electrical bio-impedance values to determine whether the presence of a volume of blood indicates an accumulation or a loss of blood.

12. (Currently Amended) An instrument for detecting fluid movement, accumulation, or depletion determining a presence of or change in fluid volume in mammalian tissue of a mammal having a body, comprising:

an injection current source of injection electrical current;

multiple electrodes configured for operative coupling to the injection current source and for placement on an external surface of the body to introduce injection electrical current flow through the mammalian tissue and thereby establish flow paths that define injection vectors along which electrical currents flow between two or more injection electrodes;

multiple electrodes configured for placement on an external surface of the body to define measurement vectors relating to electrical voltages produced in response to the electrical currents flowing between the injection electrodes;

sensor amplifier circuitry operatively coupled to the electrodes defining the measurement vectors to amplify the electrical voltages produced;

and processor circuitry operatively connected to the injection current source and the sensor amplifier circuitry, the processor circuitry programmed with instructions configured when executed to process signals representing the injection electrical currents and the produced voltages corresponding to different pairs of the injection and measurement vectors, to compute from each of different pairs of the injection and measurement vectors an electrical bio-impedance value that characterizes the electrical bio-impedance of the mammalian tissue and fluids in a region of an anatomical space, and to analyze the electrical bio-[[ ]]impedance values to detect and identify characteristics indicating fluid movement, accumulation, or depletion affecting the region a presence of or a change in a volume of fluid in the anatomical space.

13. (Original) The instrument of claim 12, further comprising memory stores operatively associated with the processor circuitry to store the computed electrical bio-impedance values, the memory stores being separable from the instrument and capable of retaining the computed electrical bio-impedance values upon separation from the instrument.

14. (Original) The instrument of claim 12, further comprising an internal electrical power supply, thereby facilitating instrument portability.

15. (Original) The instrument of claim 12, in which the sensor amplifier circuitry includes amplifier circuitry operating in a differential input mode and having a gain value suitable for electrocardiogram (ECG) signal acquisition, the amplifier circuitry operating in a differential input mode having an output, and in which selected ones of the multiple electrodes provide electrical voltages representing acquired ECG signals, multiple ones of the acquired ECG signals being operatively coupled to the amplifier circuitry operating in a differential input mode, and further comprising: pulse-generator pulse amplifier and detector circuitry to which an analog signal produced across two of the multiple electrodes is operatively coupled, the pulse-generator pulse amplifier and detector circuitry producing an output in response to characteristics of the analog signal that represent signal characteristics of a pulse produced by a pulse generator operatively connected to the mammal; and the processor circuitry programmed with instructions to process signals corresponding to the outputs of the amplifier circuitry operating in the differential input mode and the pulse-generator pulse amplifier and detector circuitry to produce an electrocardiogram signal representation.

16. (Original) The instrument of claim 15, in which the electrocardiogram signal representation produced includes a signal component that indicates a presence or an absence of a pulse-generator pulse.

17. (Original) The instrument of claim 12, in which:

the sensor amplifier circuitry includes amplifier circuitry operating in a differential input mode and having a gain value suitable for electrocardiogram (EGG) signal acquisition, the amplifier circuitry operating in a differential input mode having an output;

selected ones of the multiple electrodes provide electrical voltages representing acquired EGG signals, multiple ones of the acquired EGG signals being operatively coupled to the amplifier circuitry operating in a differential input mode;

and the processor circuitry is programmed with instructions to process signals corresponding to the output of the amplifier circuitry operating in the differential input mode to produce an electrocardiogram signal representation.

18. (Original) The instrument of claim 12, further comprising electrode selector switch circuitry through which the multiple electrodes are operatively coupled to the injection current source and the sensor amplifier circuitry, the electrode selector switch circuitry responsive to command information delivered from the processor circuitry to select which ones of the multiple electrodes introduce the electrical current flow and which ones of the multiple electrodes define measurement vectors relating to the electrical voltages produced.

19. (Original) The instrument of claim 18, in which the electrode selector switch circuitry is configured for independent selection of the multiple electrodes in response to the command information.

20. (Original) The instrument of claim 18, in which the command information delivered to the electrode selector switch circuitry selects sets of the multiple electrodes to define multiple electrode assemblies, each of the multiple electrode assemblies including on a common substrate a first electrode structure that introduces injection electrical current flow and a second electrode structure that defines a measurement vector relating to the electrical voltages produced.

21. (Original) The instrument of claim 20, in which each of the first and second electrode structures includes at least one electrode segment.

22. (Original) The instrument of claim 12, further comprising a housing connector to which a connection block module is releasably attachable for matable connection, the multiple electrodes connected by associated electrically conductive leads to the connection block module, and the connection block module including at least one of a battery, defibrillator discharge protection, or memory.

23. (Original) The instrument of claim 12, further comprising an enclosure in which the instrument is contained, the enclosure further containing one or more equipment modules that form with the instrument an integrated system by common operational access to one or more of a display, power supply, memory, controls, or input/output connection.

24. (Original) The instrument of claim 12, further comprising an enclosure in which the instrument is contained, the enclosure further containing a collection of one or more independently operating equipment modules.

25. (Original) The instrument of claim 12, further comprising an input/output connection device that is operatively associated with the processor circuitry and is configured to receive information from and to export information to an external location.

26. (Original) The instrument of claim 25, in which the input/output device and the external location are operatively connected by a communication link of one of a wire line or a wireless medium type.